

WHAT IS CLAIMED IS:

1. A microelectromechanical device, comprising:
- 5 a beam suspended by support structures affixed to first and second ends of the beam, wherein the device is adapted to pass a signal from the first end to the second end;
- 10 a pair of electrodes arranged beneath the beam; and
- a contact structure interposed between said pair of electrodes.
2. The device of claim 1, adapted to pass the signal without bringing the beam in contact with the contact structure.
- 15 3. The device of claim 2, wherein said beam comprises a contiguous layer of conductive material.
4. The device of claim 1, adapted to pass the signal upon bringing the beam in
- 20 contact with the contact structure.
5. The device of claim 4, wherein said beam comprises an insulating element interposed between the first and second ends of the beam.
- 25 6. The device of claim 1, wherein said device is further adapted to pass the signal from either the first end or second end of the beam to the contact structure.
7. The device of claim 1, wherein said device is further adapted to pass the signal
- 30 from both the first end and second end of the beam to the contact structure.

8. The device of claim 1, further comprising one or more additional contact structures interposed between said pair of electrodes.

9. The device of claim 8, wherein an upper surface of the contact structure is above
5 upper surfaces of the additional contact structures.

10. The device of claim 8, wherein an upper surface of the contact structure is approximately level with upper surfaces of the additional contact structures.

10 11. The device of claim 1, wherein said beam comprises a recessed portion above the contact structure.

12. The device of claim 1, wherein said contact structure comprises a raised section arranged upon its upper surface.

15 13. The device of claim 1, wherein said contact structure comprises multiple sections spaced apart from each other and along a width of the beam.

14. A microelectromechanical device, comprising:
20 a beam suspended by support structures affixed to respective ends of the beam;
a pair of electrodes arranged beneath the beam; and
25 a contact structure interposed between said pair of electrodes wherein the device is adapted to pass a signal between one end of the beam and the contact structure.

15. The device of claim 14, wherein said device is further adapted to pass the signal
30 between both respective ends of the beam and the contact structure.

16. The device of claim 14, wherein said device is further adapted to pass the signal between the respective ends of the beam.

17. The device of claim 14, wherein said beam comprises an insulating element
5 interposed between the respective ends of the beam.

18. The device of claim 14, further comprising one or more additional contact structures interposed between said pair of electrodes.

19. A microelectromechanical device comprising at least three contact structures
10 interposed between a pair of electrodes, wherein the contact structures and pair of electrodes are laterally spaced along and under a length of a beam.

20. The device of claim 19, further comprising a support structure attached to a first
15 end of the beam.

21. The device of claim 20, further comprising an additional support structure attached to a second end of the beam.

22. The device of claim 19, adapted to bring the beam in contact with one or more of
20 the contact structures.

23. The device of claim 22, wherein said beam comprises residual forces adapted to bring the beam into contact with one or more of the contact structures.

24. The device of claim 21, wherein said residual forces are further adapted to curl the
25 beam away from one or more of the contact structures distinct from the one or more contact structures in contact with the beam.

25. The device of claim 22, adapted to bring the beam into contact with one or more of the contact structures upon an application of one or more closing voltages to at least one of the pair of electrodes.

26. The device of claim 22, adapted to bring the beam into contact with one or more of the contact structures upon an application of a magnetic force.

27. The device of claim 19, adapted to pull the beam away from one or more of the contact structures in contact with the beam.

28. The device of claim 27, adapted to pull the beam away from the one or more contact structures upon an application of an actuation voltage to one of the pair of electrodes.

29. The device of claim 28, wherein the application of the actuation voltage is adapted to bring the beam in contact with one or more contact structures not previously in contact with the beam.

30. The device of claim 27, adapted to pull the beam away from one or more contact structures upon:

an application of an actuation voltage to one of the pair of electrodes, and

a release of a closing voltage applied to the other of the pair of electrodes used to bring the beam in contact with the one or more contact structures.

31. The device of claim 27, adapted to pull the beam away from one or more contact structures upon:

an application of an actuation voltage to one of the pair of electrodes;

a release of a closing voltage applied to the other of the pair of electrodes used to bring the beam in contact with the one or more contact structures; and

a subsequent increase of the actuation voltage.

32. The device of claim 19, wherein the at least three contact structures comprise:

a first contact structure interposed between the pair of electrodes;

a second contact structure interposed between the first contact structure and one of said pair of electrodes; and

a third contact structure interposed between the first contact structure and the other of the pair of electrodes.

33. The device of claim 32, further comprising one or more contact structures interposed between said first and second contact structures.

34. The device of claim 32, further comprising one or more contact structures interposed between said second contact structure and the one of said pair of electrodes.

35. The device of claim 32, wherein said first contact structure is arranged under the center point of the beam.

36. The device of claim 32, wherein said first contact structure is arranged closer to the one of said pair of electrodes than to the other of said pair of electrodes.

37. A method for fabricating a microelectromechanical device, comprising:

patterning an array of contact structures between a pair of electrodes; and

5 forming a beam spaced above the electrodes and contact structures such that the beam is supported at its respective lateral ends.

38. The method of claim 37, further comprising forming support structures laterally adjacent the sides of the pair of electrodes facing away from the array of contact structures.

39. The method of claim 37, wherein said patterning the array of contact structures comprises:

15 patterning base structures of the contact structures; and

patterning a raised section upon the upper portion at least one of the base structures.

40. The method of claim 37, wherein said forming the beam comprises:

forming a sacrificial layer upon the electrodes, the contact structures, and exposed portions of the substrate;

25 depositing a beam layer upon said sacrificial layer; and

removing the sacrificial layer.

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41. The method of claim 40, wherein said forming a sacrificial layer comprises:

depositing the sacrificial layer upon the pair of electrodes, the contact structures,
and exposed portions of the substrate; and

etching recesses within the sacrificial layer.

42. The method of claim 40, wherein said etching comprises etching recesses above at
least one of the contact structures.

43. The method of claim 40, wherein said etching comprises etching recesses laterally
adjacent to sides of the pair of electrodes facing away from the array of contact structures.